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Experiments on the Control of Soybean Aphid with Imidacloprid

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ABSTRACT The results of a plot experiment showed that imidacloprid at 15, 22.5, 30, 45g a.i. (active ingredient) per hectare gave good control effect against soybean aphid, *Aphis glycines* Matsumura. The control effect was over 70% four weeks after spraying. The results of demonstration field indicated its average control effect at 22.5, 30 g per hectare reached 54.0, 86.7% four weeks after spraying respectively, Yield increased by 9.1 and 10.9% respectively compared with that of omethoate treated plots.

KEY WORDS: imidacloprid, soybean aphid, *Aphis glycines* Matsumura, control

Soybean aphid is an important insect pest in soybean production in Tonghua city. Because of the annual practice of controlling soybean aphids with organophosphorus insecticides -- dimethoate or omethoate -- soybean aphids have developed resistance to these insecticides, thus the control effect of these insecticides has declined gradually. In order to screen new insecticides, the aphid control effect of imidacloprid was tested in a plot experiment and field demonstration in 1995-1996. The results are as follows.

1 Materials and Methods

1.1 Test materials

1.1.1 Pesticide: （1）10% imidacloprid wettable powder; （2）40% omethoate emulsifiable concentrate

1.1.2 Soybean variety: Fengjiao7607

1.1.3 Target insect species: soybean aphid (*Aphis glycines* Marsumura)

1.1.4 Basic condition of test area: tests were conducted in the slope field with lessive soil in Toudaozhen, Ji-an city. The soil had an organic content of 1.2% and pH of 6.8. The previous crop was corn.

1.2 Test treatment

1.2.1 Plot experiment

A randomized block design was applied with four replicates. The plot size was $30m^2$. When soybean aphids had dispersed throughout the field by 25 June, 1 kg of insecticide was sprayed on stems and leaves.

Treatment I: imidacloprid 15 g a.i./hectare; Treatment II: imidacloprid 22.5 g a.i./hectare;

Treatment III: imidacloprid 30 g a.i./hectare; Treatment IV: imidacloprid 45 g a.i./hectare;

Treatment V: omethoate 60 g a.i./hectare as insecticide comparison;

Treatment VI: water as control.

1.2.2 Large area demonstration

Demonstration area was 6 hectares that were divided into three treatments, imidacloprid 22.5g, 30g/ per hectare And omethoate 60g/ per hectare as control.

1.3 Surveying items and methods

1.3.1 Examination of effectiveness

Twelve plants at designated positions in each treatment (i.e.3 plants per plot) were examined. The number of aphids was counted before spraying and the number of surviving aphids was counted 3, 7, 14, and 28 days after spraying. Population decline rate and control effect were calculated.

1.3.2 Output survey

During harvesting season, soybeans in each plot were harvested, threshed, air-dried, and weighed separately，then the outputs of soybean were calculated accordingly.

2 Result and Analysis

2.1 Imidacloprid showed good control effect against soybean aphid. Average control effects of five inspections in four treatments were 85.0, 91.2, 92.8, 94.6% respectively.

2.2 Imidacloprid had longer effective control period. Control effects to soybean aphids in the four treatments were still 70.6, 84.8, 87.6, 90.3% respectively four week after spraying, whereas the control effect of omethoate declined to 50.6% 2 week after spraying, and no control effect was observed 3 week later.

2.3 According to the results of analysis if variance, there was a very significant difference in controlling effect on soybean aphid between the application of 15 g, 22.5 g, 30 g, 45 g Imidacloprid per hectare and the application of 600 g omethoate per hectare. Among the four treatments of Imidacloprid, the control effect of the 15 g application was also very significantly different from those with 22.5 g, 30 g, and 45 g per hectare. No significant differences in control effects occurred among treatments with 22.5 g, 30 g, and 45 g per hectare. Therefore，any dosage between 22.5 and 30 g per hectare may be used in practice to cut down the control cost.

2.4 Dosages of 22.5 g and 30 g per hectare were used in the demonstration fields，and average control effects were 84.0% and 86.7% respectively. Owing to the good aphid control effect, the average soybean yields in these two treatment fields reached 1864 kg and 1896 kg per hectare respectively, which was 9.1 or 10.9% higher than the omethoate treated plots (see Table 1 and 2).

Table 1 Control effect in plot experiment (Ji-an 1995)

Treatment	Control effect (%)						Significant level	
	3 days	7 days	14 days	21 days	28 days	average	0.05	0.01
I	90.1	92.3	91.7	80.4	70.6	85.0	a	A
II	92.4	94.7	93.2	91.0	84.8	91.2	b	B
III	94.6	94.9	94.9	92.2	87.6	92.8	b	B
IV	94.2	97.1	96.9	94.4	90.3	94.6	b	B
V	86.8	71.5	50.6	-	-	41.8	c	C

Table 2 Control effect in demonstration experiment and yield (Jian 1996)

Treament (g/ha)	Control effect (%)						Yield (kg/ha)	Increased yield (%)
	3days	7days	14days	21days	28days	Average		
Imidacloprid 22.5	91.6	91.0	83.7	80.0	73.6	84.0	1864	9.1
Imidacloprid 30	92.7	92.4	89.8	84.5	74.1	86.7	1896	10.9
Omethoate 600	90.3	78.1	54.4	-	-	44.6	1709	